

# **DIGITIZATION OF THE HEAVY MANEUVER BRIGADE: INCREASED SITUATIONAL AWARENESS AND DECREASED DECISION MAKING**

**A MONOGRAPH  
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## ABSTRACT

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The purpose of the monograph is to answer the research question: Will digitization of the heavy maneuver brigade increase situational awareness and allow the maneuver brigade commander to quickly solve problems in the conduct of decisive operations? To answer the research question, the monograph reviews the current doctrine and theory of situational awareness and decisionmaking processes that identify criteria for an evaluation of the current AWE.

When compared to current theory and doctrine the AWE may not exploit technology and enhance situational awareness as expected by the Army.

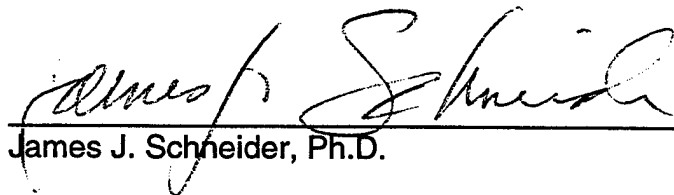
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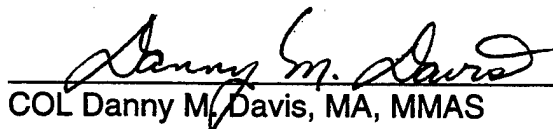
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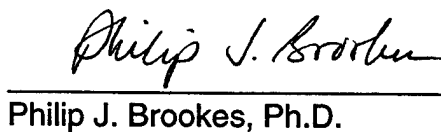
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## I. INTRODUCTION

The strategic environment has changed dramatically over the course of the past decade. The collapse of the Warsaw Pact, the unparalleled success in the Gulf War, and the effects of a robust global economy have all contributed to a requirement to adjust the way military leaders think about the strategic environment. To understand the impact of these changes for the military, we have to understand the "context in which war is fought."<sup>1</sup>

General Gordon R. Sullivan and Colonel James M. Dubik in their book, *Envisioning Future Warfare*, articulated two significant areas for understanding this change.<sup>2</sup> They contend that the end of the Cold War has resulted in two opposing trends. These two opposing, yet complementary forces are integration and fragmentation.<sup>3</sup>

These trends of integration include the rise of global economies, transnational problems such as health and migration, and the increased reliance on information and communication systems have lead to a more integrated world society. Opposed to this integration are the factors that lead to fragmentation. Ethnic and religious antagonism, power struggles in the former Soviet Union, and

elimination of superpower conflict are among the forces that create or foster fragmentation.<sup>4</sup>

Faced with the changing strategic environment the military has its own opposing yet complementary forces. These are the reduction of force structure and a diametric increase in operational missions. Force size and structure reductions require military leaders to deal with current and projected operations differently. To offset this fragmentation and support the integration of newly emerging democracies the Army conducts more stability and support operations. These types of operations, coupled with an uncertain threat, require the Army to move from a threat based force to a capability based force. As part of this evolution the Army plans to harness the benefits of the digital world and integrate them into the future Army battlefield.

The current strategic environment of today is in many ways reminiscent of earlier times. The Army, as a result of the end of the cold war, is experiencing a revolution in military affairs, reduced endstrength, smaller budgets, and uncertainty of future roles. The Army must "grapple with questions about the nature of American security



issues, the character of the next war, and the doctrine, weapons, and organization needed to face its challenges."<sup>5</sup> This quotation describes very accurately the situation in which the U.S. Army currently finds itself. Ironically, this is not a 1990's quotation. This statement, made in the 1950's, characterizes the identity crisis the Army experienced with the advent of nuclear weapons. The Army's answer to this crisis was a complete and radical reorganization that kicked off the 'Pentomic Era'.<sup>6</sup> The Pentomic Era gave way to the Pentomic Army, changing its structure, doctrine, and weapon systems. The U.S. Army eventually found it made these dramatic changes based on invalid assumptions regarding the nature of the changing strategic environment. After several years and the expenditure of enormous resources the Army concluded that the Pentomic Army had little use in its next war and virtually abandoned the concept. This occurred even though the threat of the USSR remained the threat the Pentomic Army sought to counter.

Today, faced with unanswered questions relating security threats and broadening interest, the Army finds itself moving from a threat based to a capabilities based force. During the Cold War, the

Army concentrated on maintaining the ability to counter the "threat" of the Warsaw Pact. The Army's focus and purpose were on winning the war in Europe against this known "threat". Since the end of the Cold War the Army does not have a specific threat to focus its training, doctrine, and procurement of future weapons systems. This causes the Army to shift to a force capable of handling diverse, expanding and previously unknown threats. The Army's is moving to improve capabilities in weapons systems, doctrine and structure due to these changes in the strategic environment. The Army and the nation do not see a near-peer competitor emerging who can threaten the U.S. and its national interests. The method the Army has chosen to increase its capability is through leveraging technology, primarily at the tactical level, through digitization. The significance of this shift at the tactical level is that tactics, techniques and procedures are changing to meet varying threats and circumstances. Capability-based doctrine provides a set of common decision factors to assist in thinking and deciding upon battle actions.<sup>7</sup>

Digitization is the process of leveraging the power of the microchip to enhance warfighting

capabilities. Through *Joint Venture*, one of the three concepts of the FORCE XXI Campaign Plan, the Army has conducted several Advanced Warfighting Experiments (AWE). Task Force XXI (TFXXI) conducted an AWE at the National Training Center (NTC) designated Rotation 96-07 in March 1997. An area of specific interest in the AWE was the measurement of performance with a digitally equipped Brigade Combat Team (BCT). The rotation sought to capitalize on and improve upon the prior AWE, *Desert Hammer VI* (Rotation 94-07), conducted by a battalion sized task force in March 1995. The focus of this rotation was the assessment of the BCT execution of information based operations.<sup>8</sup> The experiment also sought to measure to what extent the commander could determine, "Where am I; where are my buddies; and where is the enemy?" Would digitization give the BCT an advantage over the Opposing Forces (OPFOR)?

### ***Research Question***

The purpose of this monograph is to answer the research question: Will digitization of the heavy maneuver brigade increase situational awareness and allow the maneuver brigade commander to quickly solve problems in the conduct of decisive operations? To answer the research question, the

monograph reviews the current doctrine and theory of situational awareness and decisionmaking processes that identify criteria for an evaluation of the current AWE. Information's impact on decisionmaking will seek to determine if more situational awareness (information) results in quicker decisionmaking. Specific efforts are: focus on defining situational awareness and evaluating digitization's positive and or negative effects; review information's effect on the ability to make quicker and effective decisions; define effective decisionmaking in a tactical environment; determine how to evaluate the type and amount of information needed to make tactical decisions; compare recent AWE with other non-digitized rotations during the execution phase that identify trends in effective decisionmaking; review historical changes in technology infusion to help identify current effectiveness of adopting and integrating current technologies.

By defining terms relative to the question and conducting analysis on data available the monograph will determine if there is evidence that suggests digitization will increase situational awareness and allow for decisive operations, or whether the Army is simply allowing technology to drive requirements.

Is there a valid requirement or is digitization  
another "Pentomic" type solution to a more complex  
twenty-first Century problem?

## II. REVIEW OF TERMS AND DOCTRINE

### *Complexity*

To understand how complexity influences Army operations it is first necessary to explore and define complexity. An understanding of how a complex organization operates is fundamental to gaining knowledge of how these organizations change over time.

Complexity is the functioning of systems made up of "a great many agents interacting with each other in a great many ways."<sup>9</sup> Complex adaptive systems operate in the area of complexity and exhibit three characteristics. They display the ability to organize themselves, they adapt and they exist at the "edge of chaos".<sup>10</sup>

Detail complexity is the functioning of systems with an abundance of components that always interact in a consistent way. Even though they contain many parts that interact, a specific input produces a likely output. Dynamic complexity is the functioning of systems with many parts that act in an inconsistent manner. The systems' many parts are constantly changing and the interaction produces unpredictable outputs. The economy, the weather,

and bureaucratic organizations are examples of systems that display dynamic complexity. The complex adaptive systems addressed above also display dynamic complexity.<sup>11</sup>

To qualify as a complex adaptive system, a system must display four essential characteristics. First, it operates subordinate to dynamic complexity. It must produce unpredictable responses to consistent inputs. Second, it must have the ability to self-organize spontaneously. This means that as the system's components interact, they produce synergistic and emergent properties not displayed by the individual components. Third, the system must adapt. The system must learn from its experiences, change itself to use what it has learned, and foremost anticipate what must change to ensure future success. Finally, the system must function at the "edge of chaos." The organization must achieve an equilibrium between risks to avoid decline while maintaining control and growth to prevent the organization from becoming insubordinate and unchecked.

The Army is a complex adaptive system. It meets the criteria identified above. It displays dynamic complexity. The Army has thousands of independent

elements that are constantly interacting. These "elements" are soldiers. Because the "elements" are independent, their actions are inconsistent and unpredictable. Leadership and doctrine provide the capability to act instinctively. The Army in battle definitely operates at "the edge of chaos." Since the Army is a complex organization friction and uncertainty will continually exist on the battlefield. This complexity leads to uncertainty and often chaotic behavior.

### ***Uncertainty***

Complex organizations that desire to reduce uncertainty often implement controls that interject more uncertainty instead of reducing it. These organizations seek to control uncertainty through numerous means. They establish control mechanisms that allow leaders to interject themselves at levels well below their unassisted span of control. The question is not whether there is a need to interject, but since the capability to interject exists commanders use it. The new focus on digitization allows this capability at levels previously unknown before. Complex dynamic organizations often in their attempts to reduce



uncertainty impose control systems. Does digitization increase or decrease uncertainty?

The intended purpose of increasing the maneuver commander's situational awareness is to reduce uncertainty. By reducing uncertainty some believe that quicker decisionmaking can take place allowing for decisive operations and the ability to impose our will on the enemy. Commanders attempt to reduce uncertainty by having access to more information about the enemy, their own forces, and actions relating to both that occur.

An overriding effort in the Army digitization process is to increase situational awareness. Since Army doctrine recognizes different definitions of situational awareness these multiple definitions only compound the problem when introducing the technology to enhance it.

### ***Situational Awareness***

Doctrine and theory suggest that greater technologies in Army information systems will allow the capability to gain greater situational awareness and thereby reduce battlefield uncertainty. Information based operations allow the Army to answer the questions "where am I; where are my buddies; and where is the enemy." The premise is

that if we know these answers we can increase situational awareness. While this knowledge may contribute to greater situational awareness, does it focus on the real issue of what situational awareness really is?

FM 100-5, Operations, the Army's keystone warfighting manual, includes situational awareness under agility--one of the tenets of Army operations. It discusses the ability to perceive and anticipate change combined with the ability to act quickly by understanding the higher commander's intent. This leads to agility that is vital for success in operations other than war.<sup>12</sup> TRADOC Pamphlet 525-5, *Force XXI Operations*, defines situational awareness as the "ability to have accurate real-time information of friendly, enemy, neutral, and noncombatant locations; a common, relevant picture of the battlefield scaled to specific level of interest and special needs".<sup>13</sup> FM 100-6, Information Operations (IO), is the Army's capstone manual for IO. It states that situational awareness includes a common understanding of the commander's assessment of the situation, intent, concept of the operation, and a clear picture of enemy and friendly dispositions and capabilities.<sup>14</sup> The Army

Digitization Master Plan (ADMP) pronounces, "Situation awareness is provided by collecting, integrating and displaying a common 'picture' of the battlefield that is consistent in both time and space at each user display."<sup>15</sup> Senior Army leadership often refers to it as, "where am I; where are my buddies; and where is the enemy".<sup>16</sup> What all these definitions have in common is assisting in defining the commander's vision. These doctrinal definitions of situational awareness all seek to achieve a common end. They all seek to gain information to reduce uncertainty. What all these definitions have in common is the need for information. Digitization promises to increase the amount of information to unimaginable quantities. Since information is a requirement for defining situational awareness, what do commanders really need to achieve situational awareness?

### ***Digitization***

The intent of digitization focuses on improving the commander's capability to quickly make decisions. This should greatly enhance the capabilities of the digitized maneuver brigade and improve its ability to conduct decisive operations. According to the ADMP, "Digitizing the battlefield

is the application of information technologies to acquire, exchange, and employ timely digital information throughout the battlespace."<sup>17</sup> This information must be tailored to the needs of each commander, to enable him to maintain an accurate vision of the situation necessary to support both planning and execution.<sup>18</sup> To oversee and achieve this effort of digitization the Army created the Army Digitization Office. It developed the ADMP that established requirements for future Army digitization efforts. It identified the requirement for an integrated system to enhance situational awareness and decisionmaking to assist the commander in "mission planning, facilitate effective rehearsals, and validate the understanding of the commander's intent prior to initiation and throughout execution of the mission."<sup>19</sup>

The expectation of the ADMP is that digitization enables higher total mission awareness at all echelons. It begins with positional awareness through the digitization of systems and soldiers in the area of operations. This provides commanders with near real-time information on current unit positions and their tactical and logistical status. Intelligence sources provide information to the

commander. These include advanced sensors and spot reports from individual soldiers.<sup>20</sup> This will enable a continuous tracking of enemy locations and a widely shared picture of probable enemy intent. The relevant common picture acquired from "distributed databases" are customized for precision and functions by the level of command using the information. "The databases themselves must be able to be exchanged, accessed, and shared at the appropriate level among all agencies involved in the operation".<sup>21</sup>

A part of the Army Battle Command System (ABCS) is Force XXI Battle Command Brigade-and-Below (FBCB2). It provides an "integrated command and control system that applies horizontally across all Battlefield Operating Systems (BOS) and vertically from individual squad/platform to brigade/regimental headquarters."<sup>22</sup> Brigade-and-Below Command and Control (B2C2) is a "prototype suite of digitally interoperable BOS specific functional applications designed to provide near-real-time situational information to tactical commanders, on the move, down to platform/squad level."<sup>23</sup>

The digitization efforts focused at the BCT and below rely on two main initiatives. These

initiatives are appliqué and the "Tactical Internet". The (TI) is the network and communications system to achieve a seamless transfer of data. The appliqué contains the software and is the "desktop computer" connected to the TI. The TI functions much like the commercial internet.

Appliqué is the Force XXI Battle Command Brigade-and-Below (FBCB2) system to digitize the BCT. It includes computer hardware and software installed on weapons platforms, vehicles and deployed with individual dismounted soldiers at throughout the BCT.<sup>24</sup> The core of common application software is the command and control portion of the InterVehicular Information System Command and Control (IVIS C2) software. IVIS provides knowledge of one's location, the location of friendly and hostile forces, and of external factors, such as terrain, weather, and so forth, that may affect one's capability to perform a mission.<sup>25</sup>

The TI is the integrated battlefield digital communications network. This network provides "reliable, seamless and secure communications connectivity required to support the appliqué, other command and control systems."<sup>26</sup> It communicates with

the network using the commercially based Internet Protocol (IP).<sup>27</sup>

### ***Information and Decisionmaking***

Information is useless unless it is relevant to the situation. Commanders rely on information to begin the decision process. Once he receives this information, a commander must rely on other factors to give relevance to that information. These factors include his environment, his mental model, and intuition. Information is relevant only when considered with these other factors. Determining what information commanders need is critical to the decisionmaking process.

Army doctrine states, "The collection, processing and dissemination of integrated relevant information is the key to achieving situational awareness throughout the force, which creates the opportunity for unity of effort toward mission accomplishment".<sup>28</sup> FM 100-6 defines information as data collected from the environment and processed into a usable form. Only when data is processed or placed into a situational context does it become information.<sup>29</sup> Part of what determines this situational context is the commander's image. This

image was addressed with other factors in determining commanders' information requirements.

A Rand study examining commanders' information needs found four elements that define a commanders information needs.<sup>30</sup> The first is the particular situation that the commander finds himself in. Different situations require different and often unique information needs. Second, is the organization of the command post. What staff agencies are represented and their levels of competence and ability to process and present the information drove what a commander asked and expected. Next was the relation of the commander to his subordinate commanders. If the commander was comfortable with the subordinates he was less likely to require information from them. Conversely, if he perceived that certain subordinate commanders were less capable he required a great amount of information. Last was the commander's image.

A commander's image or "mental model", as Senge refers, to it is the most difficult to understand. This is because often the commander himself is not sure of the model he is operating from. These mental models are "deeply ingrained assumptions, generalizations, or even pictures or images that



influence how we understand the world and how we take action".<sup>31</sup> A commander's mental model determines not only the type of information he requires but how he assimilates that information into his situational awareness. If a commander is convinced that the enemy will adopt a certain course of action no amount of information presented will change his perception. He will not even realize relevant information because of his preconceived idea. This image of the commander is addressed in Army doctrine as visualization.

### **Visualization**

To achieve situational awareness, a commander must visualize. Visualization is the process of developing a clear understanding of friendly forces in relation to the enemy, seeing a desired end state, and visualizing the sequence to achieve the end state from the current disposition.<sup>32</sup> The ability to visualize is a component of the "art" in warfare, not the science of it.

According to the ADMP, "Commanders' intuition, training, and experience—coupled with digital technology will enable them to visualize the operation."<sup>33</sup> The planning process is improved with the ability to conceive and scrutinize friendly and

enemy courses of action. Commanders can convey their intent and supervise the operation to ensure that their intent and vision are carried out. Digitization provides means that allow the commander to visualize and evaluate the "sequence of actions during the battle, in near real-time".<sup>34</sup>

The review of doctrine and theory supports the conclusion that situational awareness is achieved by processing relevant information as it relates to the commander's vision. A key component required in decisionmaking is intuition.

### ***Intuition***

In his article, Intuition: An Imperative Command, Charles T. Rogers proposes that, "gut feeling or intuitive beliefs stem from rapid thinking at the subconscious level".<sup>35</sup> Intuition is gained through experience, training, and education. Intuition is itself a process. While many people make the correct intuitive decision almost instantaneously and with seeming little thought, most of these decisions in hindsight followed a rational thought process that occurred so quickly the decision maker did not recognize the process. A former commander of the Battle Command Training Program (BCTP), and the Center for Army Tactics

(CTAC) found during AAR's when a commander was asked why he took a certain action the response was "it felt right." When he engaged them in a deeper analysis he found that often they had been in a similar experience or remembered a similar experience they had studied and that this was the basis for their actions.<sup>36</sup>

### III. ANALYSIS

The whole purpose of gaining situational awareness through digitization is to allow for faster decisionmaking. According to the Army Digitization Master Plan:

"Digitization permits the warfighter to convey critical battlefield information instantly rather than through slow voice radio and even slower liaison efforts. It provides the warfighter with a horizontally and vertically integrated digital information network that supports unity of battlefield fire and maneuver and assures command and control decision-cycle superiority. The intent is to create a simultaneous, appropriate picture of the battlespace at each echelon, from soldier to commander, based on common data collected through networks of sensors, command posts, processors, and weapon platforms. This allows participants to aggregate relevant information and maintain an up-to-date awareness of what is happening around them".<sup>37</sup>

#### **Observations**

Results of the integration of digitization on the Brigade Combat Team (BCT) are mixed. The Army Digitization Office, Requirements and Evaluations Branch, compiled the following insights:<sup>38</sup>

- 1) Digitization has the ability to strongly support increased awareness of friendly

locations. This ability will contribute to over all situational awareness.

- 2) The Appliqué refined the commanders ability to "see the battlefield", but does not substitute for "being on the ground."
- 3) Low system reliability affected soldier confidence in the tactical internet.
- 4) Commanders must visualize the battle during the planning process and clearly articulate his vision to the staff to focus subordinates. The staff did not seem to have a clear understanding of the commander's vision and this caused them to have difficulty sifting through the enormous amount of information digitization provided.
- 5) The Army contention that greater situational awareness will lead to reduced fratricide was not proved or disproved in the AWE. The issue requires further analysis.
- 6) "The endstate of digital capability is not situational awareness-it should be a vastly improved ability to command in battle."<sup>39</sup>

These observations support the observations of the head of the NTC's Army Task Force Training Team and his observations of the earlier Task Force level

Rotation 94-07, Desert Hammer VI. His assessment is that digitization to increase battle command is good, "but some of the equipment is not".<sup>40</sup> The time intensive and difficult procedures required to get digitally equipped vehicles onto the tactical internet and keep them logged on resulted in difficulty in maintaining awareness of vehicle locations. More significant than the technical problems of the equipment was the difficulty of commanders to visualize the situation. Contributing to this were "inadequate training, education, experience, or intuition. They have an insufficient intuitive base from which to visualize the battle".<sup>41</sup>

The OPFOR commander for rotation 94-07 observed that the digitized units "technologically sophisticated C3I at times seemed to overwhelm the human processing capacity and degrade decisionmaking".<sup>42</sup> His perception was that intuition was not relied upon, but instead the ability of the technology to give the digitized unit a more complete picture often resulted in commanders waiting for "the final piece of information."<sup>43</sup> Information management skills were influenced by the complex environment.

## ***Information Management***

Complexity affects information management. Commanders can obtain too much information. When commanders' receive too much information complexity increases and their capacity to process the information is limited. They narrow their focus too much and are unable to see the entire scope of the problem. Commanders who try to absorb the overwhelming amount of information that occurs in either a training environment or combat will overlook critical information. The commander must establish Commander's Critical Information Requirements (CCIR) and focus only on those limited issues that actually require him to make a decision. These CCIR's should be framed in the context of a question or problem. They should not seek merely to ask for more information.

Commanders in an information rich environment must guard against the overwhelming desire to continue to seek more and more information. Often the search for information is the consuming activity rather than focusing on the decision that needs to occur. This leads commanders to delay acting on critical information since they or their staffs have overwhelmed their ability to process it.

The ability of unlimited access to an almost infinite amount of information can result in more uncertainty instead of reducing it.<sup>44</sup> It causes the focus to shift from the decisionmaking process to the information collection process. Instead of achieving the objective set out to accomplish the focus shifts to finding more and more information. Information collection exceeds that required to make the decision.

### ***Methods of Dealing with Uncertainty***

The lack of available information induces more friction. Friction, as Carl von Clausewitz observed is "the force that makes the apparently easy difficult".<sup>45</sup> The collection and dissemination of information creates friction. Commanders need information to make decisions. When there is a deficit in information, more friction is added to an already complicated decisionmaking process. Friction is increased because commanders must receive and process information to understand the context in which to make a decision.

The need for commanders to receive and process information is the same today as in earlier times. The methods of exercising command are discussed by Martin van Creveld.<sup>46</sup> Van Creveld stated that



command is an attempt to reduce uncertainty. As warfare increased in complexity commanders sought to develop ways to reduce uncertainty. "Command by direction" was the earliest form. The commander was able to control the battle by his personal presence and observation. As warfare became more complex and formations grew larger commanders tried to overcome these changes by a "command by plan" approach. This method prevailed from the time of Frederick in European armies and continues in the U.S. Army today. The third method of command is "command by influence".

What all these methods have in common is the desire to deal with uncertainty. Command by plan seeks to centralize uncertainty, the plan seeks to centralize uncertainty, and influence seeks to distribute uncertainty.<sup>47</sup> When the commander is able to direct personally the action he can ensure that he alone deals with the uncertainty. He is able to view the battle and act on situations based on his perception of events. The plan distributes uncertainty by reducing the ability of subordinates to gain the necessary information to either decrease or increase their own level of uncertainty. Influence distributes uncertainty. It accepts it as

a part of operations and does not try to reduce or induce more uncertainty to the environment.

Digitization may entice commanders to return to a command by direction approach. One of the dangers of adopting this method is that the current and future battlefields are complex environments. Commanders who focus too narrowly may miss key information. Conversely, those who try to process all the information available will find themselves overwhelmed.

The current brigade structure relies on commanders receiving information from either his observations or from reports from others. These reports are received by radio. The commander then has to mentally transform this information into a usable form. He must visually see the locations and conditions as a picture in his mind. This visualization is the key process in achieving situational awareness. The digitized brigade relies on appliqué and the tactical internet (TI) to enhance this visualization process. The data suggests that this may actually cause an already complex system to increase in complexity. The increase in complexity impacts on decisive operations.

## ***Decisive Operations***

Decisive operations cause an opponent to no longer have the will or capability to impose his will on the situation, create a predetermined state favorable to friendly forces, and cause termination of current and prevention of future activities.<sup>48</sup> These operations may not always include combat operations. The digitized brigade conducts these operations at increased tempo in a "near simultaneous manner." The brigade rapidly defeats the enemy by achieving dominate firepower and maneuver.<sup>49</sup> The digitized brigade is capable of accomplished decisive operations based on new capabilities. Doctrine contends that the brigade can occupy a greater physical volume of space without the lost of command and control through its ability to achieve greater situational awareness. This increase in situational awareness is the result of technological superiority.<sup>50</sup> The data suggest that the digitized brigade is often paralyzed by uncertainty as much if not more than the non-digitized brigade.

## IV: FINDINGS

### *Limitations*

Publication of the analysis of AWE 96-07 was not available for consideration in this monograph. Secondary sources and observations of individuals involved in the operation are included merely as a basis for discussion and should not be considered authoritative.

### *Conclusions*

This monograph sought to answer the research question: Will digitization of the heavy maneuver brigade increase situational awareness to allow the maneuver brigade commander to quickly solve problems in the conduct of decisive operations?

When compared to current theory and doctrine the AWE may not exploit technology and enhance situational awareness as expected by the Army. One of the contributing factors that limits digitization's capabilities to achieve greater situational awareness is complexity.

Complexity is unavoidable and efforts to reduce or negate it with the introduction of digitization may actually increase complexity and add to the confusion that confronts commanders when required to

make a decision. The Army operates and will continue to operate with dynamic complexity. The BCT commander will only see complexity increased as new systems are introduced to the tactical environment. The information available to the commander will only increase in volume and sophistication. The increase may cause uncertainty to actually increase as opposed to accomplishing its intended purpose of reducing it.

Uncertainty is proportional to the dynamic complexity of the situation. Since the military conducts training and operations in the most complex environments imaginable, uncertainty will impact on the ability of commanders to gain situational awareness.

Situational awareness is more than access to information that provides locations of friendly and enemy locations on the battlefield. This information alone is of little use in achieving true situational awareness. It is merely an input into the larger process of achieving situational awareness. A commander's mental model determines the context in which he views information. This mental model also assists in determining what information the commander needs to make a decision.

Once a commander frames the information based on his mental model he must visualize. Visualization is the method the commander uses to convey his intent and sequence of operations to achieve that intent to subordinates. This ability to communicate his vision is an important factor in determining what information he will task his subordinates to provide. The overriding reason for achieving situational awareness is to allow the commander to make a decision.

Decisionmaking is the true aim of gaining situational awareness. Commanders must have the ability to determine rapidly the situation and then act faster than the enemy. Intuition impacts on how fast commanders can process and assess information and arrive at a decision. To conduct decisive operations commanders must make their decisions faster than the enemy. This assists the commander in controlling the tempo of operations and puts the enemy in the situation of reacting.

Observations of the AWE revealed that low system reliability affected soldier's confidence in the quality of the information the digitized equipment provided. Since IVIS relies on the same system as voice communication, data received by a commander

was often unreliable. This unreliability stemmed from the fact that system would "drop off the net." That means the radio sending the digital information would just stop sending the signal to the receiving station. The termination of the signal was unknown to others looking at the digital display. Commanders were unsure if the information was current or outdated.<sup>51</sup>

The technical problems surrounding the AWE are not insurmountable. As the equipment matures it will at some point gain reliability. The larger and more significant problem is how commanders will use this technology to enhance situational awareness. The ability to achieve situational awareness is more than having the information on friendly and enemy locations. It requires the intuitive abilities associated with the art of command.

In the past, the Army has relied on technology as the panacea to correct perceived problems in the changing environment. The Pentomic Army was unable to capitalize on the introduction of atomic capabilities not because the bomb did not work, but because it lacked the communications ability to operate in the dispersed environment of the changing battlefield. The requirement to disperse only.

increased the complexity of controlling operations and resulted in greater uncertainty.

To deal with the uncertainty of the digitized brigade the Army should focus not only on the digitized system, but on the training and education of its commanders.

Digitization alone does not increase situational awareness and allow the maneuver brigade commander to solve quickly problems in the conduct of decisive operations.

### ***Recommendations***

The Army should continue AWE's to further expand the technical capabilities of the digitized equipment. Further refinement in the technology will eventually result in an information transfer capability that is reliable and accurate. This will eliminate the low confidence in the equipment observed in the AWE.<sup>52</sup> More important than the hardware and software of digitization is the need for the Army to capitalize of the greatest processor ever-the well trained and educated officer.

An observer of both digitized and non-digitized NTC rotations observed that "sometimes commanders suffer from inadequate training, education, experience or intuition."<sup>53</sup> This is the real



challenge and must be the goal for the Army to truly increase situational awareness and increase quicker decisionmaking. All commanders need frequent chances to train. No one would expect the head of a surgical team to perform a heart-lung transplant without adequate training and preparation.

Preparation includes education. The Army should increase the educational opportunities for its tactical commanders. These educational experiences should expose the commander to many different historical and practical situations. The increase in training, education and experience will result in more intuitive behavior in decisionmaking.

The changing environment the Army is and will operate offers many challenges. To meet these challenges the Army must continue to experiment to identify practical solutions that allow for success in the increased and varied missions it undertakes. While digitization is not in itself a solution, it does offer a potential capability to increase situational awareness. In the hands of a commander with a solid educational background, combined with multiple opportunities to conduct challenging training events to gain experience, digitization will add to the ability of intuitive

commanders to conduct quicker decisions and achieve victory through decisive operations.

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## ENDNOTES

<sup>1</sup> Gordon R. Sullivan, and James M., Dubik, Envisioning Future Warfare, (Fort Leavenworth, KS., Command and General Staff College Press, 1995), p. 2.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid., p. 2-4.

<sup>4</sup> Ibid., p3.

3A. J. Bacevich, The Pentomic Era: The U.S. Army Between Korea and Vietnam (Washington, D.C.: National Defense University Press, 1986), p. 9.

<sup>6</sup> A. J. Bacevich, The Pentomic Era. The reference to the "Pentomic Era" is widely excepted in military historical circles.

<sup>7</sup> FM 71-3, The Armored Mechanized Infantry Brigade, (Washington, DC: Headquarters Department of the Army, 1996), E-4.

<sup>8</sup> FM 100-6, Information Operations, (Washington, DC: Headquarters, Department of the Army, 1996),

<sup>9</sup> Mitchell M. Waldrop, Complexity: The Emerging Science at the Edge of Order and Chaos, (New York, NY: Touchstone, 1993), p.11.

<sup>10</sup> Ibid.

<sup>11</sup> Peter M. Senge, The Fifth Discipline: The Art and Practice of the Learning Organization, (New York, NY: Doubleday, 1990), 71 & 364-365.

<sup>12</sup> FM 100-5, Operations, (Washington, DC: Headquarters Department of the Army: 1993), 2-7.

<sup>13</sup> United States Army Training and Doctrine Command Pamphlet 525-5, Force XXI Operations, (Fort Monroe, Virginia: Department of the Army, Aug 1994), G-7.

<sup>14</sup> FM 100-6, Information Operations, p.1-11.

<sup>15</sup> Army Digitization Master Plan 1996: (Washington, DC: Headquarters, Department of the Army 1996), accessed 23 October 1997/ available from <http://www.adp.army.mil/ADMP/1996/TOC.htm>; internet), 6-2.

<sup>16</sup> CSA to CGSC Class, October 1996.

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<sup>17</sup> Army Digitization Master Plan 1996: Executive Summary, (Washington, DC: Headquarters, Department of the Army 1996), accessed 23 October 1997/ available from <http://www.ado.army.mil/ADMP/1996/TOC.htm>; internet), 1-4.  
1-44.

<sup>18</sup> Ibid.

<sup>19</sup> Ibid., p. 1-3.

<sup>20</sup> Ibid. The spot reports from soldiers include both digital and voice reports.

<sup>21</sup> Ibid., p. 1-4.

<sup>22</sup> Ibid., p. B-3.

<sup>23</sup> Ibid., p B-3,4.

<sup>24</sup> Thomas R., Goedkoop, and Barry E. Venable, "Task Force XXI: An Overview", (Military Review, Fort Leavenworth, KS., March-April 1997), 32.

<sup>25</sup> Army Digitization Master Plan, p. B-4

<sup>26</sup> Ibid. p. B-7.

<sup>27</sup> Ibid.

<sup>28</sup> FM 100-6, p. 2-6.

<sup>29</sup> Ibid. p. 2-1.

<sup>30</sup> James P. Kahan, Robert D. Worley, Cathleen Stasz, Understanding Commanders' Information Needs, (The Rand Corporation, Santa Monica, CA: June 1989), 8-10.

<sup>31</sup> Senge, The Fifth Discipline, p. 8.

<sup>32</sup> FM 100-6, p. 1-10.

<sup>33</sup> Army Digitization Master Plan, p. 1-4

<sup>34</sup> Ibid.

<sup>35</sup> Charles T. Rogers, "Intuition: An Imperative Command." Military Review, (March 1994), p.40.

<sup>36</sup> Conversation with COL Mike Kain in my office in Bell Hall 1995

<sup>37</sup> Army Digitization Master Plan, p. 1-5.

<sup>38</sup> Steven A. Emison. ed. Update on Army Battlefield Digitization, Army Digitization Office. (Washington, DC: Headquarters, Department of the Army 1996), accessed, 30 October 1997/ available form <http://www.ado.army.mil/rda-article.htm>; internet). This article is not an

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analytical analysis if the data from the AWE. It is merely observations complied "under the auspices of Colonel Steven A. Emison, Chief of requirements and Evaluations.

<sup>39</sup> Ibid.

<sup>40</sup> William G. Webster, "Enhancing Battle Command with the Tools of the 21st Century, Functional Requirements of Force XXI Digitized Battle Command." CTC Quarterly Bulletin, Center for Army Lessons Learned, Fort Leavenworth, KS: (1995), p. I-33.

<sup>41</sup> Webster, "Enhancing Battle Command with the Tools of the 21st Century, Functional Requirements of Force XXI Digitized Battle Command." p. I-35.

<sup>42</sup> Harry G. Simmeth. JR., "Fighting the Digitized Force, A personal experience monograph", U.S. Army War College, Carlisle Barracks, PA: (1995), p.1-21.

<sup>43</sup> Ibid. p. 91.

<sup>44</sup> Dietrich Dorner, The Logic of Failure: Why Things Go Wrong and What We Can Do to Make Them Right, (New York, NY: Metropolitan Books, 1996), 99-104.

<sup>45</sup> Michael Howard and Peter Paret, ed. and trans, Clausewitz, On War, (Princeton, New Jersey: Princeton University Press, 1976), 121.

<sup>46</sup> Martin Van Creveld, Command in War, (Harvard, MA., Harvard University Press, 1985). Additionally, many of the opinions are based on my reading of Thomas J. Czerwinski, "Command and Control at the Crossroads", Parameters, Carlisle Barracks, PA: Autumn 1996..

<sup>47</sup> Thomas J. Czerwinski, "Command and Control at the Crossroads", (Parameters, Carlisle Barracks, PA: Autumn 1996).

<sup>48</sup> White paper from internet available at <http://www-cgsc.army.mil/CDD>.

<sup>49</sup> FM 71-3, The Armored Mechanized Infantry Brigade, p. E-6.

<sup>50</sup> FM 71-3, The Armored Mechanized Infantry Brigade, appendix E, list ten capabilities of the digitized brigade. See appendix E for a more through discussion.

<sup>51</sup> Steven A. Emison, ed. Update on Army Battlefield Digitization, p2

<sup>52</sup> Ibid.

<sup>53</sup> Webster, "Enhancing Battle Command with the Tools of the 21st Century, Functional Requirements of Force XXI Digitized Battle Command." p. I-35.

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